



ADVANCED SCIENCE AND TECHNOLOGY INSTITUTE

Department of Science and Technology
ASTI Bldg. C.P. Garcia Ave.,
U.P. Technology Park Diliman, Quezon City
Philippines 1101

Phone: (632) 426-9755, (632) 925-8598

Fax: (632) 426-9756

E-mail: info@asti.dost.gov.ph

Copyright © by ASTI 2005



ASTI 2005 Annual Report

ADVANCED SCIENCE AND TECHNOLOGY INSTITUTE

DEPARTMENT OF SCIENCE AND TECHNOLOGY



TECHNOLOGY DOES NOT SLEEP



VISION

"The Advanced Science and Technology Institute shall be among the leading Research and Development centers in Information and Communications Technology (ICT) and Electronics within the South East Asian region."

MISSION

"The Advanced Science and Technology Institute is committed to the development of the Filipino society and the Philippines as a nation. We shall contribute to the attainment of national development priorities and the growth of Philippine enterprises by providing innovative solutions using ICT and Electronics technology."

CONTENTS

4	Messages	46	Scientific Linkages and Institutional Cooperation
6	Highlights	51	Financial and Human Resources Management
8	Programs and Projects		



Congratulations to ASTI on your 19th year anniversary! ASTI has certainly come a long way from its humble beginnings as an R&D institute with a meager budget. Over the years, the Institute has proven to be in the forefront of cutting edge and advanced network technologies. Notably, it was the first to undertake R&D in Internet Protocol version 6 (IPv6), Voice over IP (VoIP), and the first to develop an all-Filipino open source desktop solution - the Bayanihan Linux.

I am happy to see that ASTI's efforts and initiatives are now focused on developing innovative solutions for the effective integration of ICT in the various sectors, undertaking collaboration with government and

academe to ensure that the needs of the community are addressed. I hope that ASTI continues to show its commitment to creating an enabling environment to achieve the goals of national development.

Let me give recognition to an equal combination of drive for excellence, proactive leadership, and competent and dynamic staff as the key factors for ASTI's success. Under this formula for success, I am certain that the Institute will continue to cope with the rapid developments in ICT and Microelectronics and remain to be a leader in R&D in these fields of expertise. To Denis and the rest of the ASTI family, more power!

A handwritten signature in black ink, appearing to read 'A. Alabastro'.

ESTRELLA F. ALABASTRO, Ph.D.

Secretary, Department of Science and Technology



The year 2005 is a challenge-filled year for ASTI. The beginning of the year witnessed the Institute going through a reorganization to effect a more responsive and service-oriented organization, and provide more focus on its programs. Toward this end, ASTI embarked on high-impact, cross-agency projects that focused on the integration of ICT in critical government services. This is through the implementation of a number of projects under the eGovernment funding, covering the areas of education; nutrition; test, analysis and calibration; and disaster management.

At the same time, we continued to implement programs and projects in software development, advanced networking technologies and applications, wireless technologies, and microelectronics, striving to create an enabling environment where these technologies and applications can be shared through our technology-transfer programs. Along this line, ASTI became a CSC-accredited training institution this year. This recognition has inspired us to develop more relevant training programs.

DENIS F. VILLORENTE

Officer-In-Charge and Deputy Director
Advanced Science and Technology Institute

Another significant achievement for ASTI this year is the commercialization of three (3) ASTI-developed products: the ASTI Digital Multimeter, the GSM Data Terminal, and the Bayanihan Linux (BL) version 3.1. In fact, the demand for the BL version 3.1 increased when the BSA and the government intensified its campaign against the unlicensed use of software. Efforts are currently underway to develop the BL version 4 containing more improved features and capabilities.

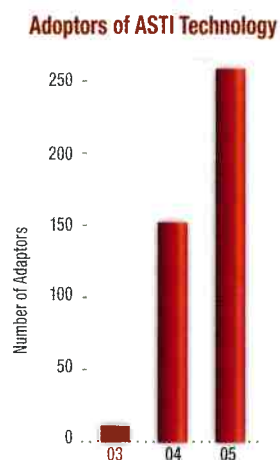
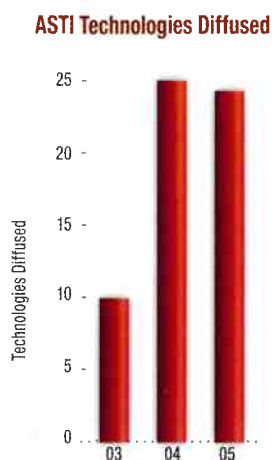
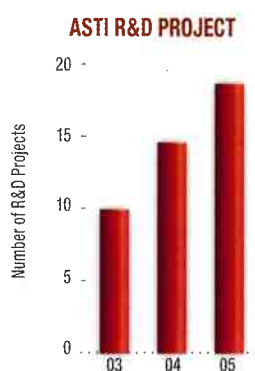
As we draw closer to ASTI's 20th year anniversary, the Institute is even more committed to strengthen our R&D initiatives towards developing innovative and cost-effective solutions at par with more expensive, commercially developed products; continuing collaboration with government, academe and research institutions to ensure that R&D goals are responsive to the current needs of the sectors that we serve; and establish strategic partnerships with industry key players to keep up-to-date of latest industry trends in ICT and microelectronics development.

I would like to acknowledge and thank the dynamic women and men of ASTI for their continuing dedication and hard work. Congratulations to all of us!

HIGHLIGHTS

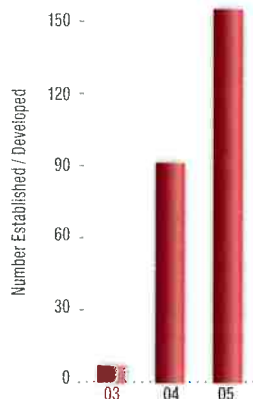
The year 2005 was another banner year of accomplishments for ASTI. It continued a trend of increasing R&D projects from 14 in 2004 to 18 in 2005 (an almost 50% increase since 2003), and high levels of technology diffusion and technologies developed or improved. Exploiting the external funding opportunities, ASTI grant-in-aid almost quadrupled in 2005. This allowed ASTI to venture deeper into its R&D programs whilst maintaining a modest GAA budget.

Although the number of technologies commercialized decreased, ASTI exploited the most out of its current capabilities by increasing technology adoption, counted in number of adoptors, almost double that of 2004 levels. Likewise, consultancy services almost doubled that of 2004 levels.

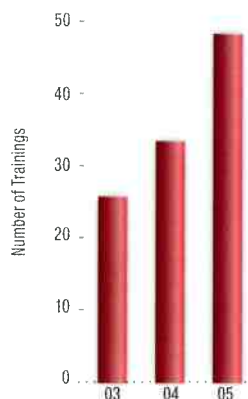


The past year saw a significant increase in the S&T infrastructure established or improved (from 97 in 2004 to 126 the past year). Also, trainings for clients in government, academe, and private sector also intensified: trainings conducted increased by about 33% and number of training participants nearly doubled in 2005. Technical services rendered, likewise, nearly doubled in 2005.

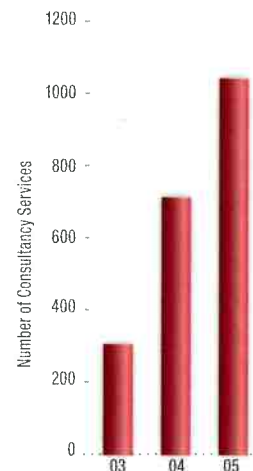
**S&T Infrastructure
Established/ Developed by ASTI**



Trainings Conducted by ASTI



**Consultancy Services
Rendered by ASTI**



Information and Communications Technology (ICT) R&D Program

PREGINET - Regional Collaboration and Information Sharing on Pandemic Influenza Preparedness and Response Using Advanced Networks

Client

Department of Health (DOH)

Philippine Council for Health Research and Development (PCHRD)

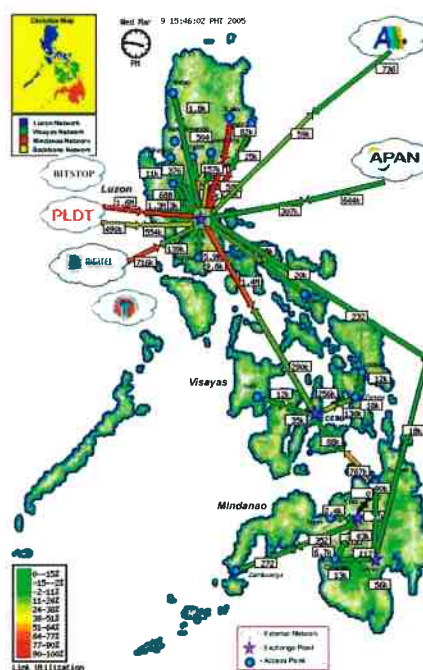
Asia Pacific Economic Cooperation – Emerging Infections Network (APEC-EINet)


Summary

The DOH is the principal health agency in the Philippines, responsible for ensuring access to basic public health services to all Filipinos through the provision of quality health care and regulation of providers of health goods and services.

The PCHRD on the other hand, is the focal point for health research and development in the country that provides leadership and direction in health and related

R&D activities. With their respective mandates, DOH and PCHRD complements each other, with the former focusing on the implementation of health programs, and the latter providing key support in health R&D. The PCHRD is the main focal point for the APEC-EINet in the Philippines.





The APEC-EINet works to increase collaboration among academicians, policy makers and trade officials concerned with emerging infections in APEC member economies. It organized the first Virtual Symposium on Pandemic Preparedness and Response in order to explore how each economy is preparing for, and planning to respond to, pandemic influenza and other emerging bio-threats. ASTI, recognizing that this initiative is in line with one of the user communities of PREGINET, provided technical and coordination support to DOH and PCHRD to enable the participation of the Philippines in the virtual symposium.

The Business Challenge

The APEC-EINet applies advanced networking communications technologies to facilitate communication and partnering among leading research universities, governments, and other advanced networking entities within APEC economies. By facilitating cooperation among public health sectors of the member economies, and integrating existing systems of computing and communication into this collaboration, the entire Asia Pacific region can reduce the biological and economic threat posed by emerging infections.

Specifically, APEC-EINet strives to: (1) improve public health emergency preparedness in APEC member economies; (2) reduce economic risk in these economies through enhanced collaboration across sectors in preparing for epidemic disease; (3) used advanced high-quality network technologies and applications for secure communication, collaboration and visualization; (4) continue to provide timely, reliable, and accurate disease alerts and updated distance learning materials as core activities of APEC-EINet; and (5) strengthen working relationships among sectors within and among economies.

In pursuit of the objectives of APEC-EINet, the first Virtual Symposium on Pandemic Influenza Preparedness and Response was organized. The overall aim of the virtual symposium is to promote regional information sharing and collaboration to enhance bio-preparedness against pandemic influenza and other emergent threats. In order to improve preparedness regionally, it is vital to understand how each economy in the region is undertaking preparedness and response planning. This activity is in line with recently endorsed APEC Health Task Force (APEC HTF) recommendations.

Ten (10) countries participated in the virtual symposium, namely: Australia, Canada, People's Republic of China, Republic of Korea, Philippines, Singapore, Chinese Taipei, Thailand, USA, and Vietnam.

The Philippines' participation in the virtual symposium is significant for the country because it was a good opportunity for the country to gain knowledge and understanding of how other countries in the region are addressing the Avian Flu, which hit the region in recent months. Although the Philippines, as declared by the DOH, is "Bird Flu Free", knowing how other countries prepared and responded to the avian flu epidemic would help the country to be better equipped with preparing and responding to possible threats of the virus.

How ASTI Helped


ASTI handled the technical coordination for the Philippines. The Access Grid node at ASTI, which is among the two in the country, was used to facilitate the Philippines' participation (the other node is at the

International Rice Research Institute or IRRI wherein ASTI also assisted in its set-up). ASTI conducted a number of technical testing with APEC EINet in the USA, and the other participating sites prior to the event.

Results

The use of advanced networking technology, i.e. Access Grid, provided numerous advantages, such as:

- cut down on the time and cost of traditional conferences requiring long-distance travel
- conduct of simultaneous communication with multiple sites, enabling numerous visualization options on screen
- and conduct of simultaneous web-based information exchange, maximizing the benefits of the Internet



Implementation of E-Learning Programs Through the Philippine Research, Education and Government Information Network (PREGINET) Infrastructure

Client

Science Education Institute (SEI)

Summary

The Philippine Research, Education and Government Information Network (PREGINET) actively promotes and advocates its services, products and applications that are developed and/or enhanced by the various research teams under the project. In line with the objectives of PREGINET, these services, products and applications are for the benefit of all PREGINET partners, and aim to facilitate their activities over the network, as well as encourage collaborative activities among partners. In essence, PREGINET provides the platform upon which these activities are carried out. Particularly, the DOST-SEI partnered with PREGINET to carry out their e-learning initiatives, using PREGINET developed and/or enhanced applications, and the network infrastructure.

The Business Challenge

One of the mandates of SEI is to formulate and implement plans for the promotion, development and improvement of science and technology education and training. The Institute develops, supports and coordinates national programs for quality science education through scholarship programs, teacher training, and curriculum development.

In line with this mandate, SEI conducted a Trainers' Training Workshop for the e-Training Program for Science and Math Teachers. The training was conducted with the following objectives: (1) orient the trainers from the e-training network institutions to ASTI's VClass, the learning management software proposed for use in the e-training program; (2) help trainers from the e-training network institutions to develop comprehensive course guides for inclusion in the course package to be used in the e-training program; and (3) orient e-training program network institution coordinators to registration and student support provision for an on line training program.

In pursuit of the first objective, SEI partnered with ASTI to use the PREGINET-enhanced application Virtual Learning Classroom (VClass) System. The VClass is the

e-learning platform that they will use for their e-training program. VClass is an open source e-learning platform developed by the Distributed Education Center at the Asian Institute of Technology (AIT). It is specifically designed for delivering on line course by two different methods – through “virtual classroom learning” or “virtual class on demand”.

How ASTI Helped

ASTI conducted a training on how to use the VClass E-Learning tool as an on line medium to support the technical needs of the distance learning project. The workshop had two concurrent sessions, UPOU's course development track and ASTI's VClass training.

The 3-day workshop for the teachers was in preparation for the E-training project. The project's pilot will run for 10 months. There were customized VClass users' presentations for each day. Two days were allotted for the VClass training. The first day was for the trainers wherein the instructor role of VClass was introduced to them. There were hands-on exercises prepared as well. The mobile server was set up in NCC's LAN for the exercises. For the second day, the coordinators were

introduced to the student functions of VClass. These groups are the ones to provide technical assistance to their students in the actual project.

As a follow-through to the training conducted, ASTI created a VClass mailing list which serve as a venue for the trainees to post their concerns and other queries on the VClass. ASTI will be providing the final list of users and their roles to be added to the production server (<http://vclass.pregi.net>) and to the VClass mailing list, courses to be added and linking of the project's site to the production server.

Results

Through the use of open-source applications and technology, as well as utilization of videoconferencing technology, SEI has achieved considerable financial cost savings as well as on time, effort and energy, but without compromising the quality of the service provided. This aligns well with the government's efforts on fiscal austerity.

Bayanihan Linux 3.1

Clients

Government Agencies, Schools, SME's.

Summary

ASTI proposed the development of an alternative desktop solution for government agencies, schools and SMEs to reduce the dependency on proprietary software. It promoted the software thru sales, training, technical support, seminars and conferences to raise awareness and foster interest on open source software.

Business Challenge

Information Communication Technology (ICT) has dramatically changed the way people do business and go about their lives. The Internet, email, on-line conferences, e-learning, and mobile phones are examples of tools that provide the right information to people at the right time. The challenge for the Philippines as stated in the UNDP 2003 Digital Review of Asia Pacific is to ensure that all Filipinos enjoy the benefits of the information age by broadening Internet

access which not only requires physical infrastructure and content but also Internet literacy.

The National Government declared its support by stating that ICT will be the leading sector for economic growth and the key to finding the Philippine's proper niche in the global village in the 21st century. It is stated that Filipinos should enhance their competitive edge in these three areas: Building physical infrastructure for wider and greater affordability; enhancing the policy and legislative environment; and enhancing ICT human resource development.

However, the Asia-Pacific Development Information Program reports that PC penetration in the Philippines is only 1.9 for every 100 persons, while Internet penetration is 6 for every 100 persons. Roughly 4.5 million of the total 76.5 million Filipinos, and 2 out of 3 Internet users belong to the upper and middle economic class.

According to the NSCB, the annual per capita threshold for the Philippines in 2002 is 11,906 pesos. With the rising cost of proprietary software, only people with the means have the opportunity to utilize ICT effectively.

For most Filipinos the prohibitive cost of commercial softwares practically locks them out of access to

knowledge and the tools to manipulate that knowledge, thus worsening the digital divide in the country. In response to the Philippine situation, it became ASTI's mission for government agencies, schools and SMEs to reduce their dependency on proprietary software and encourage local capacity building in software development.

How ASTI Helped

ASTI developed a more economical desktop solution named Bayanihan Linux -- an operating system that is easy-to-install and easy-to-distribute. It is bundled with an interoperable office suite, personal information management suite, and multimedia support. Bayanihan Linux is based on open source, meaning the software and its programming code are distributed for free.

Bayanihan Linux Desktop and Manual

More often than not, first time users of Linux express resistance to changes with the system environment. In that light, Bayanihan Linux was customized to have a desktop environment similar to Windows. However, there are still other functionalities that do not operate

exactly the same way. There is an average learning curve for users to fully accept the nuances of the Linux system. The Bayanihan Linux team provided a manual for the operating system, to help users perform common tasks on their own.

Support

The rapid development of software applications within the Open Source community made Bayanihan Linux a tedious challenge for technical support. Technical support incidents have helped both the technical support team of BL and the users improve troubleshooting of open source software. The technical support team of BL has also been releasing updates and bug fixes on the BL operating system. Inquiries regarding the Bayanihan Linux's version releases are also being addressed to by the technical support team. Aside from that, The BL technical support channels have been helpful for new users of Bayanihan Linux. A 24/7 support, as mentioned by some users, though will help assure end-users to migrate to the product.



Trainings and Seminars

The Bayanihan Linux team developed course materials for Bayanihan Linux Operating System. By conducting formal trainings on BL, the team was able to help organizations migrate to open source more easily.

The free seminars conducted to requesting schools and companies contributed to an increased awareness on Open Source and Linux. A survey conducted in MIT (Mapua Institute of Technology – IT Center) shows that 99% of the audience who are either IT literate or majors in computer courses had no experience with Linux before the seminar. These programs have helped catalyzed schools and individuals to form advocacy groups and even celebrate IT events with Open Source awareness programs.

Important Facts

ASTI's Bayanihan Linux was awarded 5th place among the top ten best e-Practices in the Philippines by the APEC Digital Opportunity Center (ADOC, <http://www.apecdoc.org/webTAbountUs01.aspx>) in Taiwan.

SEI Courseware

Clients

Filipino elementary students.

Summary

In line with the goal to promote Science and Math education in the Philippines, and to help Filipino elementary students better understand the basic concepts on Science and Math taught in classrooms, the ASTI in collaboration with the Science Education Institute (SEI) came up with a project to develop supplementary Computer-Aided instructional (CAI) materials in Science and Math. These CAI materials are interactive audio-visual presentations based on Science and Math educational modules provided by SEI.

These supplementary instructional materials served as lesson introductions or enrichment activities for students. These modules take advantage of visual and auditory stimulation found in television shows, and combine them with the level of interactivity employed in video games, to form an entertaining educational medium that encourages student participation and thus enhances the students' learning experience.



The Business Challenge

The Department of Education admits that basic education for young Filipinos have been declining. Of Grade 6 kids, only 26 percent have a mastery of English, 15 percent of Science and 31 percent of Math. This has been attributed to lack of investment in education, partly caused by fiscal constraints. Aside from policy and structural interventions, instructional materials shortages are being addressed through innovative use of ICT for instruction for technical subjects like science and math.

The courseware modules are CAI materials intended to supplement students' knowledge on the basic concepts of math and science using an animated and interactive learning environment. While books remain the standard in imparting knowledge, the courseware materials will use an audio-visual presentation format, complete with

distinct cartoon-like characters and voice-overs, as well as engaging sound effects, much like those found in educational television shows. Unlike television shows however, the courseware materials allow the students to actively participate in the lessons by manipulating the elements of the presentation using the computer keyboard and mouse to enhance the students' learning experience.

Each courseware module focuses on a specific lesson, provides exercises during the lesson presentation, and has an evaluation at the end of the lesson to determine how much the student has learned. The exercises serves as feedback mechanism which gives the student an immediate idea of how much he or she has understood the lesson without having to rely on the teacher's assessment.

How ASTI Helped

SEI conducted a training workshop for Science and Math teachers, to come up with scripts that will be used in the development of Computer-Aided Instructional Materials. ASTI, with its capabilities developed interactive audio-visual presentations, capable of running in an Open

source or Windows platform, for the scripts developed by the science and math teachers.

The tasks assigned to ASTI included modifying the manner of presenting the lessons to simulate a more interactive feel; create and animate characters to help students navigate through each lesson; conceptualize storyboards and themes that is unique to each lesson; provide necessary animation, sounds and programming logic for each lessons.

The group translated the modules from written form to digital format and made them enjoyable and entertaining without compromising the lesson content, by including games which required complex programming skills aside from the standard graphic animation method needed.

By adapting characters from Filipino folklores instead of anime-inspired characters, the developers were able to create characters that effectively caught the student's attention, and at the same time retaining the Filipino identity of the courseware.

To optimize the performance of each module on low-end computers, the developers implemented vector graphics technology instead of the traditional frame-by-frame animation using bitmap images. The modules were then

tested to run on low-end computers to check on any lags in animation or performance.

Results

Through this project, ASTI and SEI were able to produce 101 elementary-level Science and Math educational modules. The modules were then burned to CDs, with each CD containing either Math or Science lessons for one grade level. Some are also made available in the internet for downloading. The modules were then distributed to public schools for free, while to some, especially to private school, were made available for a minimum fee.

Important Facts

The courseware modules were developed using Macromedia Flash MX 2004, and are designed to run using Linux and Windows operating systems.

Tests, Analyses and Calibration Information System (TACIS)

Client

Department of Science and Technology (DOST) and companies from various industries (cloth, paper, wood, metal, food, cosmetics)

Summary


The Tests, Analyses and Calibration System (TACIS) is a project made possible by the E-Government funds under the Commission on Information and Communications Technology (CICT). It is a structured information system that improves the operational capability of the various testing, analysis, and calibration services offered by the Department of Science and Technology (DOST). TACIS provides interactive services that will manage all inquiries and concerns from their clients on a 24/7 basis.

This project is in collaboration with the different agencies and regional offices under DOST which are handling all the services available on the site.

Business Challenge

All materials (may it be cloth, paper, wood, metal, food, cosmetics) require different types of testing in every stage of processing. Tests are conducted to check on the material properties, composition, tolerances, and quality. In a country like the Philippines, which houses almost all types of industries, materials testing prove to be indispensable.

Locally, DOST and its agencies such as Food and Nutrition research Institute (FNRI), Forest Products Research and Development Institute (FPRDI), Industrial Technology Development Institute (ITDI), Metal Industry Research and Development Center (MIRDC), Philippine Nuclear Research Institute (PNRI), Philippine Textile Research Institute (PTRI) and other DOST Regional Offices (DOST ROs) have been commissioned to handle testing, calibration, and analysis services. The regional offices and agencies were formed to make their system more organized. For instance, a specific agency such as MIRDC handles all testing services for metal samples, FNRI handles all testing services concerning food



products, and so on. However, this setup is quite tedious for some potential clients because these agencies are not available nationwide. In fact, the agencies do not have other branches. For clients who are based in the provinces, they have no other choice but to travel to Manila in order to submit their queries, do their follow-ups, and claim their test results and certificates.

How ASTI Helped

ASTI developed a 24/7 open service web portal enhances the testing, analysis, and calibration services of DOST that allow them to become more accessible to their clients. ASTI extended assistance in rendering support services and resources for the development and test deployment of the TACIS web portal.

The challenge is to formulate a website that would unify the services and transactions of the DOST regional offices and agencies which will make them more accessible to everyone and which will somehow accelerate their service procedures.

Clients can browse for the available DOST services, request for service quotation, and track their transactions from start to finish without having to travel

long distances and, for some, even possibly doing this right in the comforts of their own homes. Clients are able to view and are kept updated on all the services they have availed in a single website. There is no need to go through the websites of each agency or call the agency involved for follow-up.

TACIS provides a linkage not only between clients and implementing agencies but also among the implementing agencies and regional offices. It provides an easier and perhaps cheaper means of accessing the numerous test and analysis services being catered by DOST. TACIS also imparts information by showing the clients which tests may be conducted on a particular sample material and which agencies are handling the said tests. This project has transformed the way test services are being carried out.

Results

The TACIS website is expected to have a complete record of all the transactions made by the user. In some instances, a single sample might require several tests which, in turn, may be conducted by different laboratories. With TACIS, the user may be able to view



the status and other details of each test on a single page, regardless of which laboratory is handling it.

Clients and laboratory personnel would be able to gain more knowledge through the test details and other information that are posted on the website. Likewise, they are further encouraged to participate and utilize the DOST test services that would help them deliver products with good quality.

Through this website, an increase in the demand and clientele for the testing and calibration services is anticipated since they are now more accessible to the clients. Thus, this also entails an increase in the income of the various DOST agencies and ROs. In addition, the Philippine market will likely have an increased percentage of products that passed the right quality standards owing to the available information and services being offered on the site. As a whole, this project is expected to bring DOST closer to the Filipinos and to help it achieve its goals of delivering quality service.

e-Nutrition - Establishment of the Philippines' Knowledge Center on Food and Nutrition

Client

Government Agencies, such as the Department of Agriculture (DA), **Department of Health (DOH)**, **Department of Social Welfare and Development (DSWD)**, National Economic Development Authority (NEDA), National Nutrition Council (NNC), etc.

Legislators and Legislative **Committees**, such as Senate and Congress Committees on Health, Agriculture, and Oversight

- Local/Foreign and Private/Non-Government Organizations, such as Nutrition Center of the Philippines (NCP), Nutrition Foundation of the Philippines (NFP), Helen Keller International (HKI), Save the Children Rotary Club, International Life Sciences Institute (ILSI), etc.
- Agencies of the United Nations (UN), such as UNICEF, World Health Organization (WHO), Food and Agriculture Organization (FAO), World Bank (WB), Asian Development Bank (ADB), etc.
- Local Government Units (LGUs)

- Food Industry, particularly Manufacturers of Vitamin-Fortified Foods
- Health and Fitness Institutions/Centers
- Researchers engaged in the Advancement of Food and Nutrition Sciences
- Policy Advocates
- Other Beneficiaries, may include students, nutritionists, dietitians, other health and medical professionals

Summary

The Establishment of the Philippines' Knowledge Center on Food and Nutrition or "e-Nutrition" project seeks to improve the nutritional status of Filipino population by providing electronically accessible information on food consumption, nutrition and health status, and other essential indicators that will be useful for policy-making, monitoring, evaluation, planning, and development of nutrition-related programs. It shall be the primary source of public files such as the National Nutrition Surveys. Moreover, the project includes nutrition assessments that will assist local government units, non-government organizations, schools, and communities to determine

prevalence of under-nutrition and over-nutrition, as well as dietary management tools for individuals to develop a healthy weight management plan.

The Business Challenge

The National Nutrition Survey (NNS) is the primary source of nutrition statistics in the Philippines conducted by Food and Nutrition Research Institute (FNRI) to assess the Philippine food and nutrition situation of the population for the appropriate formulation and modification of food and nutrition policies and interventions as well as related development programs.

Usually, processing of NNS results will take a year after the reference date for a nationwide dissemination due to the following factors:

- Large volume of data are being handled
- Tedious processing of survey results
- Several validation/verification test runs are being conducted
- There is no automation system in place

Another factor that may limit maximum utilization of

survey data and results is its inaccessibility. Most of the results are stored in FNRI's internal databases and other government agencies. If one wishes to obtain a copy, this person needs to physically visit FNRI.

The challenge of the project is to improve the nutritional status of the Filipino population by providing electronically accessible:

- a) Information on food consumption, nutrition and health status, and other essential indicators that will be useful for policy-making, monitoring, evaluation, planning, and development of nutrition programs;
- b) Public files such as the National Nutrition Survey (NNS); and
- c) Nutrition assessment and dietary management tools that will:
 - Assist local government units, communities, non-government organizations, schools, and individuals determine nutritional status and prevalence of under-nutrition and over-nutrition
 - Assist individuals develop a healthy weight management plan

How ASTI Helped

With the use of modern technology and in line with the government's goal of building a robust knowledge-based economy, an automated and online knowledge center will allow the electronic dissemination and utilization of nutrition survey data and results.

e-Nutrition is a web-based information system designed to significantly improve accessibility of nutrition-related information such as food consumption; nutritional anthropometry (human physical variation); clinical and biochemical nutrition; nutrition economics and statistics; and nutrition knowledge, attitude, and practice. It includes essential and modularized features such as:

- Real-time processing of food intake assessments
- Dietary management tools for tabulation and graphing
- Geographic mapping of nutrition-related information in the Philippines
- Online and real-time uploading, processing, and generation of statistics based from FNRI and customer's raw data

- Provides customizable reports on nutrition related statistics based from FNRI's nationwide periodic surveys
- E-payment enabled
- Provides system administration tools for proper monitoring and maintenance of the system

Research results will then provide valuable inputs for the formulation of national, regional, and community development plans for the identification of priority groups and areas for nutrition intervention programs.

Results

Numerous government agencies has benefited from the project particularly in the formulation and planning of their health and nutrition programs.

Cost-Effective, Timely, Accurate Weather Forecasts with Cluster Computing and Numerical Modeling

Client

PAGASA

Summary

PAGASA uses old bulky, slow and expensive supercomputers to do numerical modeling for weather forecasts. ASTI helped PAGASA build a cluster of workstations that does the job of its old supercomputers many times faster for a fraction of the price. ASTI's faster and more scalable cluster computing solution thus provides timely and accurate forecasts based on newer meteorological models.

The Challenge

PAGASA provides weather information in order to ensure safety and economic security of Filipinos through disaster preparedness and mitigation. They use a variety of tools in order to meet their mandate and among these tools are numerical models using computers which

has become more and more like the standard digital forecast output of international weather services. These models are computationally-intensive applications requiring expensive supercomputers in terms of both capitalization and operations and maintenance. In fact, the most powerful computers on Earth are used in meteorology and the earth sciences. PAGASA uses a monolithic supercomputer to run their numerical model. It takes 10 to 12 hours for the model to run a 72-hour forecast and, thus, PAGASA has to use the results of the previous night during their daily map meetings since they cannot process the current day's data fast enough. The supercomputer is also unavailable when there is inadequate cooling due to its sensitivity to heat.


How ASTI helped

ASTI deployed a Linux-based cluster using fourteen 64-bit Intel Xeon workstations to deploy a cheaper solution that exceeds the existing computing capacity of the PAGASA's supercomputer. Using standard message passing interface, the High Resolution Model (HRM), a new model from Deutscher Wetterdienst (DWD) as well as the more established 5th Generation Mesoscale

Model (MM5) were installed. Together, the cluster of workstations acted as the supercomputer where the numerical models can run fast.

Through its research and education links such as Asia Pacific Advanced Network (APAN) and Trans Eurasia Information Network 2 (TEIN2), ASTI was able to download global data from DWD. This data defines the global forecast which can be localized (numerically) for use in the HRM forecast for the Philippines. ASTI used its own GSM kit to relay synoptic data from remote stations to PAGASA central office.

PAGASA personnel were also assisted by ASTI in developing their post processing for automation so that everything from downloading, configuring, running and post-processing are done without any human intervention. This was originally planned to be done manually. ASTI was also able to design and implement an automated work flow so that everything from downloading, configuring, running and post-processing were done entirely without human intervention. Finally, ASTI provided training and coaching on the Linux cluster system to PAGASA.



The HRM results can also be accessed directly by Filipinos using SMS. This provides far-flung provinces and communities without good wireline infrastructure to be able to access important weather information almost instantly for only a few pesos.

The current setup will also form the basis for the ensemble forecasting of PAGASA using HRM, MM5, Eta and other weather models that will soon be incorporated and run on the cluster.

Results

ASTI's development and implementation of the cluster computer and leverage of global research and education networks now makes it possible for the numerical weather forecast of the day to be available in time for the daily map meeting of the forecasters of PAGASA. Seventy-two hour forecasts are completed in just one hour and at better forecast resolution. In May 2006, for instance, HRM correctly predicted the path of typhoon "Caloy" to hit Mindoro Island directly, a forecast missed by other models. Thus PAGASA was able to provide timely and accurate weather advisories to the public through its advisories as well as online and text. ASTI's

cluster computing solution proves that cost-effective state of the art weather forecasting is possible and can help save lives and livelihood of Filipinos. .

Department of Science and Technology – Information and Communications Technology Project (DOST-ICT)

Client

Department of Science and Technology (DOST)

Summary

The DOST-ICT project aims to modernize the Department of Science and Technology's ICT infrastructure as well as develop applications that run over that infrastructure. It is a continuation of the project "Strengthening the DOST Management Information System and Information Delivery Infrastructure".

It is focused on three major components - information infrastructure, information systems development, and personnel training.

The Business Challenge

The project aims to enhance the Department's ability to improve internal operations and provide front-line services by the effective use of ICT. This includes:

- Maintaining, operating, and strengthening the Department's ICT infrastructure, providing means to improve the exchange and delivery of information within the Department and its various stakeholders
- Developing, deploying, and maintaining applications that support the Department's operations, including those for human resource management, project management, document tracking, and experts database.
- Empowering the DOST personnel in effective use of ICT through appropriate training.

How ASTI Helped

Information Infrastructure

The following information systems were developed:

Information Systems Development

The development of new systems as well as

enhancement and deployment of existing systems were done by ASTI. These systems include:

Human Resource Management Information System (HRMIS)

The Human Resource Management Information System (HRMIS) is a comprehensive and proactive human resources system designed to provide a single interface for government employees to perform the human resources management functions efficiently and effectively. HRMIS is composed of six modules, namely, Daily Time Record, Employee, Division Chief, Director, Cashier, and the Human Resource Modules. These modules together automate the manual HRM operation processes and improve the paperless HRM capabilities.

Project Management Information System (ProMIS)

The Project Management Information System (ProMIS) was developed for more effective management of R&D projects and programs administered by the Department. It is designed to automate the intricate procedures undertaken by every DOST agency in their role on managing S&T projects and programs.



Experts Database (ExDB)

The Experts Database (ExDB) enables DOST agencies as well as other agencies to manage their pool of experts from a central repository of profiles of Filipino scientists and experts in the field of science and technology. The system aids agency personnel in searching Filipino experts in the field of science and technology.

Document Tracking System (DTS)

The Document Tracking System (DTS) is a centralized system for dissemination of documents over all DOST agencies and helps reduce manual and fax transmission of documents from one agency to another. The DTS is the primary medium of official communication, where users concerned get notified of such documents through embedded links in their email. They could provide comments and track revisions on the document through a built-in forum. Document flow can also be set and revisions can be logged in the system.

Personnel Trainings

ASTI also conducted end-user trainings on the various information systems developed for end-users of the

various DOST agencies. The trainings familiarized the participants with the various information systems through actual hands-on activities based on a structured set of training modules.

In addition, basic trainings on Open Source Technology were also conducted for DOST agencies to provide participants with a working knowledge on Open Source technologies for use in common office applications, networking and telephony. These trainings were also provided in view of the migration of government offices from licensed commercial software to freely licensed open source systems. By empowering DOST agencies with know-how on open source technologies, their migration situation is mitigated and the initial resistance to possible changes were reduced with proper information and education. In addition, free training on anti-virus and spam was conducted in collaboration with a leading vendor in the field to enhance the security of existing DOST computers.

Results

From the various systems developed, and the trainings conducted, DOST is expected to realize operational efficiency, improved decision making, reduced time-



to-competency, increased individual and organizational learning, and promoted innovation on various areas of human resource management, project management, and general operations.

Commercialization of Bayanihan Linux Thin Client Manager (BLTCM): An Open Source Thin Client Implementation

Client

Government (at all levels)

Academe (schools, universities, and colleges)

Small and Medium Enterprises (SMEs)

Not-For-Profit (NFP)/Non-Governmental Organizations (NGOs)

Libraries

Summary

Bayanihan Linux Thin Client Manager (BLTCM) software is the main deliverable of the project entitled "Commercialization of Bayanihan Linux Terminal Server Installer: An Open Source Thin Client Implementation Project", of ASTI. The project has been funded by

Technological Innovation Commercialization Program (TECHNICOM) of Department of Science and Technology (DOST). The project was established with a vision to catalyze the use of Open Source client-server computing in public and private organizations. It also aims to maximize computing resources by converting old or legacy computers into diskless client computers, enabling organizations to pursue computerization efforts with minimal expenses.

The Business Challenge

The project was carried out in response to the need of computers that involve lower cost of ownership and resource maximization, such as thin client systems. This set-up has the following characteristics: all applications run on the terminal server; workstations are "thin"; and they have no software, hard drives, CD-ROM drives, and floppy drives. Thin-clients are perfect for schools because they are easy to install and require little maintenance. They are reliable and immune to malicious tampering and viruses. Building upon the Linux Terminal Server project (LTSP), diskless Linux terminal workstations were installed at about a third of the cost of Windows/PC workstation computers.

For many organizations, thin client computing system and the use of Open Source software can provide more cost-effective network computing than traditional PC workstation/server architectures that utilize commercial proprietary software, data format, and communication protocols.

The challenge is to catalyze the use of Open Source client-server computing in public and private organizations especially schools. It is more about maximizing computing resources by converting old or legacy computers into diskless client computers, enabling organizations to pursue computerization efforts with minimal expenses.

How ASTI Helped

Using the base technologies of Bayanihan Linux operating system and Linux Terminal Server Project (LTSP), ASTI developed an administration tool for thin client computing system that utilizes Open Source software. It provides cost-effective network computing than traditional PC client-server architectures that utilize commercial proprietary software, data format, and communication protocols.

BLTCM provides significant benefits such as:

- Centralized desktop administration

Applications and upgrades can be provide to multiple users. Furthermore, any changes made on the server are immediately effective involving no interaction with individuals.

- Central management of virus protection

Virus updates can be automatically implemented to all workstations reducing maintenance tasks and improving network security.

- Reduced exposure to theft

Confidential and important documents can be easily secured because of centralized storage of data.

- Increased data protection

Backup of sensitive information can be easily implemented without the need to access and check individual workstations.

- Reduction in end-user support

Thin client/server model allows IT Staff to support significant number of users as compared to fat client implementations.



PROGRAMS AND PROJECTS

- **Control over user flexibility**

Because of the absence of hard drives in client workstations, installation of unauthorized applications, virus infections and unintentional desktop corruption will be eliminated.

- **Remote access**

Users are able to access their application and documents from any desktop for roaming user work scenarios.

- **Improved performance**

Centralized, server-based management simplifies and improves application deployment and upgrades, thereby speeding up roll-outs.

Cost reduction

Hardware upgrade costs can be reduced, and software licensing expenses can be eliminated thereby maximizing an organizations available resources.

Results

The system has contributed to cost-effective network computing in the following locations:

- San Bartolome High School – Quezon City
- Itaas Elementary School – Muntinlupa City
- Department of Computer Science in UP Diliman – Quezon City
- Veritas Parochial School – Paranaque City
- Pasong Tamo Elementary School – Quezon City

Microelectronics R&D Program


**VCTI-Micro - Contract Research:
Development of Controllers for Dental
Equipment**

Client

Soniford Maeller Corporation

Summary

Soniford Maeller Corporation (SMC) is a dental equipment manufacturer in the Philippines. The company manufactures its own line of dental chairs



and other dental equipment. ASTI has been working with SMC in improvement of its products through the use of microcontrollers since 2002. ASTI was able to design controllers for the dental chair and the dental light cure and continuously improve their performance in compliance with the specifications given by the company.

The Business Challenge

Soniford Maeller Corporation specializes in the manufacturing of high quality and competitive dental equipment. It continues to grow its business and expand its client base by offering affordable, quality and innovative products. It was able to penetrate the local market and is slowly succeeding and gaining ground in the export market.

The company focuses on research and development to further improve the quality of its products. It has advanced facilities and can manufacture almost all the components that go into its dental chair. One of the challenges that it faced in coming up with its complete design is the lack of capability in the design of electronic systems, specifically in the use of microcontrollers, for its controller.

The Department of Science and Technology through the Advanced Science and Technology Institute implemented the VCTI-Microelectronics project to stimulate the wider use of microelectronic technologies and help local small and medium enterprises (SMEs) design more competitive products using these technologies. Microcontroller-based designs is one of the expertise of the group which SMEs can avail of. Microcontrollers can be used for low cost, flexible, and high integration electronic systems. In general, the microcontroller device options can be used in products which need some logging, control, timing and display functions, as well as sensor information processing. Typical benefits of the adoption of microcontroller technology include reduced component count, lower production cost (brought about by reduced component count), and reduced development time for next generation products because of the inherent flexibility in the embedded programs. Microcontrollers are found in many common application areas like consumer and automotive electronics.

How ASTI Helped

ASTI was able to help SMC by providing expertise in microcontroller-based design. It was able to design controllers for the dental chair and the dental light cure. It also improved on the design to incorporate additional features as specified by SMC.

Results

The boards that ASTI developed for SMC helped improve their products to enable them to compete in the global market.

VCTI-Micro - Use of the Openlab Training Series Materials

Client

**Advanced Research and Competency
Development Institute (ARCDI)**

Summary


The Advanced Research and Competency Development Institute (ARCDI) provides high-quality and cost-

effective trainings to the semiconductor and electronics industry players. It aims to address the widening gap between the engineers' skills and industry needs and increase the availability of skilled manpower for high technology industry. ARCDI has been granted a non-exclusive right to use the OpenLab Training Series Materials which enabled them to offer courses in VHDL and FPGA-Based Design Flow.

The Business Challenge

ARCDI aims to enable globally competitive Philippine high-technology companies by providing world-class training and competency development support to the semiconductor and electronics industry players. It provides learning opportunities to upgrade the skills of Filipino engineers and stay in the leading edge of global technological developments. It offers training modules on specific competency areas which are centered on industry requirements.

The Department of Science and Technology through the Advanced Science and Technology Institute implemented the VCTI-Microelectronics project to build the capability of the local electronics industry in microelectronics



design. Through this project, the OpenLab - a design laboratory which can be used for training and applied research, was established. Courses in Very High Speed Integrated Circuit Hardware Description Language (VHDL), Programmable Logic Devices (PLDs), and Full-Custom Analog and Digital Integrated Circuit (IC) Design were developed and conducted.

How ASTI Helped

Having the same objective of building the capability of the local Filipino engineer, ARCDI was granted a non-exclusive right to use the the OpenLab materials in VHDL and Programmable Logic Based Design Flow. These courses were conducted at ARCDI in August 2005. The quality of the materials was rated good and excellent by the training participants. The instruction materials were found to be clear, effective, and useful as a future reference guide.

Results

The partnership between ASTI and ARCDI the use of the training materials enabled ARCDI to offer courses in VHDL and Programmable Logic Based Design Flow

without incurring the development cost for the course materials. It is beneficial to ASTI because ARCDI has provided another venue for the offering of the courses. ASTI is giving ARCDI continued access to the improvements in the training materials.

VCTI-Micro - Use of OpenLab facilities for FPGA-Based Design

Client

Symphony Consulting

Summary

Symphony Consulting is an IC and embedded systems design house which provides expertise in digital, analog and mixed signal design and verification. It specializes on the development of cores in VHDL for FPGAs such as Xilinx, embedded systems hardware design, and programming in C/Linux. ASTI was able to help Symphony through the OpenLab, an electronic design facility established under the VCTI-Microelectronics Project to provide tools to help small and medium enterprises that want to engage in FPGA-based design activities.

The Business Challenge

Advances in microelectronics have made a significant impact on industry and commerce making microelectronic technologies the key to innovation and wealth creation in most industrial sectors. Despite this, most companies, especially small and medium enterprises, have not taken full advantage of existing microelectronic technologies to become more competitive and achieve a wider penetration of their home and export markets. This has limited their ability to innovate and compete in a market place that is becoming increasingly global.

The Philippine electronics industry, even though the highest export earner in the country, does not fully benefit from the advances in microelectronics as most of its activities have very low value add, like those related to the assembly and test of components that were designed elsewhere. Even though these components are assembled and tested here, their adoption in the country is not very prevalent. Programmable devices such as the Field Programmable Gate Arrays (FPGAs) represent a class of devices within microelectronic technologies, and its use is not very popular among the local companies because of lack of expertise and tools. FPGAs enable a

number of functionalities to be integrated into a single chip, which brings a lot of improvements in the circuit design due to the decrease in number of components and size of printed circuit board.

The lack of tools, experts, and success stories in the utilization of microelectronic technologies such as the FPGA are the major barriers for its adoption. Most companies would usually not want to take the risk associated with the adoption of new technologies. They would want to try out the technology before investing in new equipment and in training their employees. The Department of Science and Technology through the Advanced Science and Technology Institute implemented the VCTI-Microelectronics project to stimulate the wider use of microelectronic technologies and to help in lowering these barriers. Through this project, the OpenLab - a design laboratory which can be used for training and applied research, was established. It provides a venue for local companies to work on their designs with the guidance from trained engineers.

Symphony Consulting, a start-up IC design house and embedded systems company in the Philippines, was found to be an ideal user of the OpenLab. Initially not having the hardware and software it needs for FPGA-based design,

its engineers made use of the facility to evaluate the tools before they decided to secure their own.

How ASTI Helped

ASTI was able to help Symphony Consulting through the OpenLab by providing the Xilinx Design tools to its engineer when it was starting in 2004. The tools were used to familiarize the engineer with the FPGA-based design methodology using Very High Speed Integrated Circuit Hardware Description Language (VHDL). In 2005, another engineer availed of the trainings in VHDL and FPGA, which were organized by the OpenLab. These engineers made use of the testing facilities provided in the laboratory as well.

Results

The OpenLab facilities provided Symphony Consulting a venue to explore the tools for FPGA-based design before deciding to invest on it. It also provided the logic analysis system which was used to test the design.

In its pursuit of helping the Philippine electronics industry and academic institutions, the Virtual Center

for Technology Innovation in Microelectronics (VCTI-Microelectronics) and the Advanced Science and Technology Institute established a venue to further enhance the local designers' skills and talents.

The OpenLab facilities are available for public use, interested parties may email openlab@asti.dost.gov.ph for more information.

Embedded Systems Development – Digital Multimeter

Client/Partner

Yongden Technology Corporation

Summary

The handheld digital multimeter (DMM) is the most common of all electrical and electronic test instruments. This portable test instrument is capable of handling various electrical measurement such as AC/DC voltage, current and resistance measurement and other added features that make this device a true "multi" meter.

Digital MultiMeter, compared to analog meters,



Embedded Systems Development - PAGASA: Severe Weather Notification via SMS

provides greater accuracy, wider measurement range, special features and outstanding compactness at a reasonable cost.

How ASTI Helped

ASTI's Embedded Systems group, through specifications and cost requirements provided by the client, designed and developed the digital multimeter.

Results

The digital multimeter successfully underwent the design, prototype and production stages. It is now currently being retailed to its target market which are electronic design and electrical engineers, students and hobbyists.

Client

PAGASA

Summary

The Philippines is frequented by storms and other severe weather phenomena that routinely cause damage to lives and property. Although natural disasters caused by severe weather cannot be eliminated, measures can be taken to lessen their impact on the community. Disaster managers need to be informed ahead of time to help them make the necessary preparations.

The Severe Weather Notification System of PAGASA provides timely delivery of information to warn disaster managers in potentially affected areas, helping them in making decisions and prompting them to take the necessary action. The system sends SMS alert messages directly to their cell phones, allowing them to receive the critical information at any time, even if they are outside the office.

How ASTI Helped

ASTI helped PAGASA develop the Severe Weather Notification System. The system consists of several key components:

Contacts Database

The system maintains a database containing information such as name and mobile number for key persons such as heads of local government units. Individual contacts are organized hierarchically by Municipality, Region, and Province, and also in recipient-groups such as PAGASA Key Officials, OCD, etc.

Severe Weather Notification Program

Recipient selection

The system allows notification messages to be addressed to an individual recipient, or to all key persons listed under a particular municipality, region, province, or group. The user would just have to check the particular contacts or groups on the list that they need to notify.

Message editing with templates

Alert messages can be composed or edited with the message editor, which keeps track of the message length. The system also maintains templates of common messages, which the user can select from.

Confirmation

To ensure that the message content and selected recipients are correct, a confirmation dialog is displayed before the alerts are transmitted. All messages are also stored in a log file.

GSM Modem and SMS Gateway Software

Transmission of the alert messages via SMS is made possible by ASTI's GSM Data Terminal. This is a combination of GSM modem and SMS gateway software developed by ASTI.

Results

The Severe Weather Notification System of PAGASA has integrated text messaging which enables it to send SMS text alert messages directly to the cell phones of disaster managers in potentially affected areas, helping them in making decisions and prompting them to take the necessary action.



Technology Transfer Program

Technology Commercialization

2005 was a banner year for ASTI as far technology commercialization is concerned. ASTI digital multimeter (DM705), developed by the Institute in cooperation with Yongden Technology Corp. (YTC) through the financial assistance of DOST-TECHNICOM, was launched during the 2005 National Science and Technology Week (NSTW). It was the first commercially packaged consumer product of ASTI sold at the local market. This complete digital meter can measure voltage, current, resistance, capacitance, frequency, and transistor. Compared with other commercially available alternative products, ASTI digital multimeter has almost the same features and equally superior quality as those of the high-end digimeters and yet sold at a comparatively low price of P500. YTC has projected that around 900 units will be manufactured by the end of January 2006 and 4,000 units in March 2006.

Another remarkable technology developed by the institute and made available to its target users is the GSM data terminal. It is a data communication solution that can be used to develop applications that

can communicate with any SMS-capable device and can automate the handling of incoming and outgoing messages as well as other data. A total of 21 units of GSM data terminal were sold this year at P12,500 per package generating a gross sales of P262,500. Among the organizations that acquired this package were the Philippine Atmospheric, Geophysical and Astronomical Services Administration, Philippine Rice Research Institute, Department of Social Welfare and Development, National Meat Inspection Service, U.P. Manila Medical Informatics Unit, U.P. Diliman Computer Center, Imperium, and Cerulean Software. With regard to potential investors, GSM Data Terminal is a promising investment opportunity for applications developers, content providers, resellers, original equipment manufacturers, and independent hardware vendors.

Finally, Bayanihan Linux v.3.1 was successfully launched and marketed this year. This is the best alternative desktop solution for Filipinos, so far. It provides better hardware support, operation simplicity, speed, efficiency, stability, and Windows portability. About 238 CD and DVD copies of this Open Source software were sold to clients, majority of whom were professionals and students. A total gross sales of P25,440 was generated.

Technology Diffusion

Diffusion of products and technologies has evidently been a good mechanism being adopted and sustained by ASTI to catalyze its technology transfer and commercialization endeavors. Some of the technology diffusion efforts done for the year have generated promising results. After seeing product demonstrations and presentations, some prospective takers became interested on the GSM data terminal and Bayanihan Linux. Others signified their interest to connect to PREGINET and avail of the services.

All in all, twenty-two (22) ASTI-developed technologies were diffused to potential adoptors. Among these technologies presented and demonstrated were GSM data terminal, NetMon's MRTG/MRTG viewer, PREGINET connectivity, Access Grid Node, PC-based access point, E-Learning/Vclass system, Bayanihan Linux versions 2 and 3.1, Rice Seed Stock Inventory System, and ASTI Interactive Billboard/Bluetooth technology. A total of 8,721 client firms and individuals benefited from technology/product presentations and demonstrations. The client firms consisted of government organizations such as the House of Representatives, Information Technology Center for Agriculture and Fisheries -

Department of Agriculture, National Computer Institute - National Computer Center, Regional Information Technology and Electronic Commerce Committee V, Philippine Postal Corporation, National Book Development Board, Office of Civil Defense, Open Academy for Philippine Agriculture, Department of Foreign Affairs, Agricultural Training Institute, and many others. On the academe side, universities and schools like U.P. Computer Center, Eastern Visayas State University, Romblon State University, Palompon State University, Don Mariano Marcos Memorial State University, Tarlac State University, STI Meycauayan, University of Baguio, Batangas State University, Notre Dame University of Marbel University, Western Mindanao State University, etc. were noted. Moreso, private companies such as Link-Up Central, EDS Innoventions, and Infocom were also represented when the diffusion activities were carried out by the institute.

Technical Services

In pursuit of its commitment to respond to the scientific and technological requirements of industry, academe, and government, ASTI continued to provide technical services. These services rendered benefiting 559

clients consisted of DNS gov.ph registration, OpenLab facilities, PREGINET connection, server co-location, webhosting, videoconferencing and videostreaming, and other network-based services. The clients were composed mostly of government entities such as the Philippine Rice Research Institute, National Disaster Coordinating Council, National Computer Center, National Irrigation Administration, Department of Transportation and Communication – Telecommunications Office, Department of Agriculture – Information Technology Center for Agriculture and Fisheries, National Mapping and Resource Information Authority, and many others. It is also interesting to note that academic institutions such as the Asian Institute of Management and U.P. Open University also sought the assistance of ASTI.

Consultancy Services

Significant accomplishment was achieved in the delivery of consultancy services. A total of 1,032 services were rendered surpassing the 1,000 target for the year. Except for the work on Access Grid done for the International Rice Research Institute, all consultancies provided were informal in nature. Private companies such as

Faartech, Inc., Moldex Group of Companies, Link-up Central, Trident Electronics, Cyware Inc., Nutrilicious, JT Consulting Service, Ejobs.net, Internet Cafe and HRM Philippines Inc. had solicited ASTI's technical advice primarily on Bayanihan Linux, GSM Data terminal, and implementation of Field Programmable Gate Array. Clients from the government and academic sectors as well as international and foreign organizations included Nippon Telephone and Telegraph East Corporation, ASEAN Virtual Institute of Science and Technology, Department of Foreign Affairs, Philippine Postal Corporation, Department of Health, National Disaster Coordinating Council, Municipality of Escalante, Central Luzon Information Sharing Network, Quirino State College, Benguet State University, etc. They consulted ASTI on the PC-based Access Point, GSM Data Terminal, PREGINET connectivity, PICWIN project, Bayanihan Linux, etc.

Trainings and Seminars Conducted/ Organized

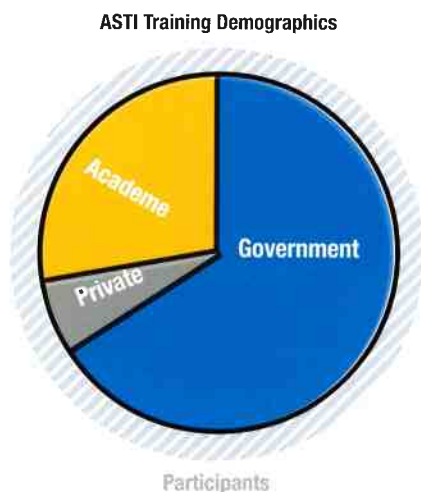
For the year 2005, Team Training under the Knowledge Management Division conducted thirty seven (37) ICT and Microelectronics trainings for various sectors. Of this total, twenty-five (25) trainings were conducted for the government, three (3) were conducted for the private sector, and nine (9) were delivered for the academe.

A total amount of P677,697 was paid to ASTI for the conduct of trainings. The trainings, which generated income for ASTI, were Data Conversion Fundamentals, Introduction to Full-Custom Digital IC Design Flow, Bayanihan Linux, Open Office, Open Source, Vclass, Developing Database-driven websites, and Analog IC Design. The course on Open Source garnered the highest amount paid among the trainings with P255,039. It was followed by Developing Database-driven websites with 135,000, and Bayanihan Linux with P81,510. Meanwhile, ASTI also conducted fourteen (14) non-income generating trainings which were purely technology transfer efforts. Ten (10) of said trainings were under the DOST-ICT project, three (3) under the VCTI-RF Micro Project, while one (1) each under the PICWIN and E-NUT projects.

For this year, a total of 734 participants attended the trainings of which 484 (66%) participants were from the public sector, 47 (6%) were from private institutions, while 203 (28%) were from the academe. On the average, approximately twenty (20) participants attend each training. In terms of gender, there were more female (308 or 58%) than male trainees (246 or 42%). In terms of Performance Evaluation, the trainers and speakers garnered a Very Good performance rating from the participants. The trainers were rated based on the following criteria: Knowledge on the subject matter; preparation and planning of the presentation; selection and use of training aids; ability to encourage participants to ask questions; readiness to answer questions; clarity and articulateness of speech, stimulate interest in the subject, and on professional conduct.

Meanwhile, the participants rated the training courses they attended as Very Good. The criteria considered were on: how well the training was organized; the sufficiency of the depth and breath of course content; sufficiency of time allotted for the course; whether the topics were informative and in line with the objectives; the appropriateness of the methodology for the course content; if the schedule

PROGRAMS AND PROJECTS



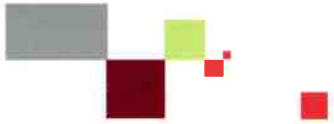
was well paced and flexible; and the usefulness of the subjects covered to the participants.

On the Course Materials, the participants generally rated them as Good. Their evaluations were based on whether the instructional materials were printed clearly; if the instructional materials and visual aids were clear and effective, and whether the materials are useful as future reference.

For the Support Service, they were rated as Very Good. The participants gave the rating based on the training staff's helpfulness and concern with the participant's needs. On the facilities, the participants generally rated them as Very Good. The rating was based on the criteria whether the Audio-visual equipment and computers worked efficiently and whether the training facility was effective and conducive to learning. As for food, the participants rated it as Good based on the sufficiency of quantity and quality.

Contract Researches

Contract R&D proved to be a pragmatic approach for developing technologies and products. This mechanism has encouraged sharing of knowledge and resources between ASTI and public sector and private clients, and has ensured utilization of R&D outputs. However, despite the advantages of going into contract R&D, the Institute was not able to prioritize this activity during the year essentially due to lack of manpower resources and focused more on new projects. The number of contracted researches has decreased from 6 in 2004 to 2 this year. These research activities focused on the development of Dental Chair version 2 and Dental Light Cure version 4 as well as an Open Source Integrated Library Management System (ILMS). The two dental products were developed for Soniford Maeller Corporation, a local company involved in the development and marketing of dental equipment. The database system, on the other hand, was done for the Local Governance Resource Center (LGRC) Project being implemented under the Philippines-Canada Local Government Support Program Phase II (LGSP II).



Development of an Open Source Library Management System for the Local Governance Resource Center (LGRC) of the Local Government Academy (LGA)

Client

Local Government Academy-Local Government Support Program (LGA-LGSP)

Summary

The LGSP is a capacity development program (2000-2006) funded by the Canadian International Development Agency (CIDA) that is aimed at promoting efficient, responsible, transparent, and accountable governance through the implementation of initiatives and projects that enhance capacities of local government units (LGUs) and civil society organizations (CSOs). One of the projects under LGSP is the Local Governance Resource Center (LGRC) designed to support DILG Regional Offices by providing them access to relevant knowledge. The LGSP engaged the services of ASTI to assist in the implementation of the Multimedia Knowledge and Information Facility

component of the LGRC project. ASTI was able to develop an integrated library management system using open source technology.

The Business Challenge

As a result of the Local Government Code (LGC) or Republic Act No. 7160 and in response to the Philippine government's policies on devolution, the Philippines-Canada Local Government Support Program (LGSP) was conceived on October 11, 1991 with the signing of a Memorandum of Agreement between the governments of Philippines and of Canada thus, making LGSP a key contributor to the critical work on local governance.

The LGSP currently establishes a variety of partnerships as part of its implementation strategy. Through its national and seven regional offices, it works with LGUs and civil society organizations to help them identify their capacity development needs, implement capacity development programs, apply new skills and systems, and institutionalize improvements.

In line with this thrust, LGSP embarked on a project called the Local Governance Resource Center (LGRC) which is designed to support DILG Regional Offices, through the

Local Government Academy (LGA), a training institute of the DILG, to carry out its responsibility of strengthening both the management and technical competence of local officials and functionaries by giving LGU access to wealth of knowledge. The project is envisioned as a dynamic and interactive facility that will promote a culture of learning and venue for continuous updating of local governance knowledge and information. The LGRC project shall make use of the recent developments in ICT and is made up of four components which include: 1) Multimedia Knowledge and Information Facility 2) Capacity Development Facility 3) Public Education on Good Governance and Development and Citizenry Facility 4) Linkage Facility.

LGSP sought the assistance of ASTI to help implement the Multimedia Knowledge and Information Facility Component of LGRC. Ultimately, with this partnership, ASTI hopes to connect LGSP to PREGINET for content and capacity development benefiting both parties and their associates.

How ASTI Helped

In pursuit of the project's objectives to develop an open source library management system of the LGRC Library, a database technical guide, and a system manual and users' guide for administrators and developers, ASTI provided services to develop and deploy the LGRC Library Database System, working in close collaboration with the LGSP technical team.

ASTI employed the following methodologies:

Specifically, the following tasks were carried out:

1. Planning and Data Gathering.
2. Set up of testbed and installation of software.
3. Customization and testing.
4. Training and capacity building, deployment and evaluation.
5. Technical support.

Proposed the necessary technical and administrative requirements for customizing the open source system particularly PHPMyLibrary to the LGRC library requirement including:

1. Back-end database structure.
2. User interface modules.
3. Front-end interfaces reflecting the basic library services as defined in the LGRC library policies.
 - Developed a detailed work plan, and developed a customized software for open source library database for review and approval of the LGRC Technical Team.
 - Developed the Technical Guide for System's Administrator, User's Guide and an LGRC Coordinator's/Librarian's Guide in close coordination with the Project Team.

The task was undertaken for a period of 45 days. The integrated system was eventually named the Local Governance Resource Center Integrated Library Management System (LGRC ILMS). It uses a secure, reliable and free operating system, web server, database server and firewall. The LGRC ILMS is actually

a combination of a free and publicly licensed library automation system and a digital library software.

Results

The main considerations in the system design and development were cost effectiveness and system efficiency. The system installed, because it uses open source technology, will incur considerable savings for LGSP. Moreover, it is web-enabled to provide for a more efficient exchange of data and/or content between and among regional libraries.

Capability building for the project staff and the system's administrators were also taken into consideration in the project design to equip them with the necessary know-how on implementing the system.



Asia Pacific Advanced Network (APAN)

ASTI, through its Philippine Research, Education and Government Information Network (PREGINET), represents the Philippines as member of APAN. The Philippines' link to APAN, which is funded by the Ministry of Agriculture, Forestry and Fisheries Research Network (MAFFIN) of Japan, was established since March 1998. This interconnectivity provided opportunity for the Philippines' research and education community to gain access to global R&E networks. A number of R&E activities and projects have also been facilitated through this interconnectivity and collaboration. Since January 2004, ASTI has been the direct termination point in the Philippines for this Japan-Philippines MAFFIN link. The capacity was just recently upgraded from 6Mbps to 155Mbps to handle more content, applications and activities over the network.


ASTI continues to strengthen its active participation in APAN through meetings and conferences and collaboration in the development and deployment of network-based applications for agriculture, natural resources, disaster management, advanced networking technologies, among others. ASTI-PREGINET participated

in the APAN Meetings held in Bangkok Thailand last January 24-28, 2005 and in Taipei, Taiwan last August 23-26, 2005. DOST, through ASTI, will play host in the 23rd APAN Conference, which will be held in Manila from Jan 22 to 26, 2007. APAN meetings promote collaboration on the development of an advanced networking environment for research and education communities in the Asia-Pacific region and encourage further global cooperation and networking of research and education communities.

Asia-Pacific Advanced Network (APAN) is an international R&E network that coordinates and promotes an advanced networking environment for the research and education communities in the Asia-Pacific Region.

Asian Internet Interconnection Initiatives (AI3)

ASTI is also a member of the Asian Internet Interconnection Initiatives (AI3), an international research consortium which aims to provide an open Internet testbed for the research and academic community in Asia. AI3 aims to promote sharing of expertise and knowledge among researchers and



engineers in Internet technologies to accelerate local Internet development and to develop technologies and applications for the benefit of the Internet community.

ASTI also actively collaborates with AI3 on R&D initiatives on advanced networking technologies and applications. ASTI, through its Philippine Research, Education and Government Information Network (PREGINET), is connected to the AI3 network which consist of a 1.5Mbps uplink and a 9Mbps downlink. The said connectivity allows ASTI and those partner institutions that are connected to PREGINET to conduct applications such as Internet Protocol version 6 (IPv6), videoconferencing and videostreaming, e-learning applications, health, bioinformatics, and disaster mitigation applications, over the network. It also facilitates the participation of ASTI and PREGINET partners in the activities and lectures of the School on the Internet (SOI-Asia). SOI-Asia is a project that aims to contribute to the higher education development in Asian countries through the utilization of the Internet and Digital Technology and by fully making use of the educational resources and technology of SOI. One of the 2005 SOI-Asia Lectures attended by ASTI staff through videoconferencing and videostreaming was on the course entitled "Object Oriented Software

Development". The Vietnam International Conference and Expo on "Open Source for e-Governance" was also streamed over PREGINET through the AI3 and SOI-Asia network infrastructure.

For 2005, ASTI participated in the meeting and advanced networking technologies workshop organized by AI3, SOI-Asia and the Widely Integrated Distributed Environment (WIDE) of Japan held in Thailand last October 2005.

Trans Eurasia Information Network 2 (TEIN2)

The DOST, through ASTI, represents the Philippine's participation in the Trans Eurasia Information Network 2 (TEIN2) Project since 2004. The project is already on its Phase 2B Implementation Phase, which involves having the network fully operational and providing connectivity to partner institutions. DOST-ASTI's Philippine Research, Education and Government Information Network (PREGINET) will facilitate the connectivity of the academe, research and government institutions in the country to TEIN2. The initial connectivity capacity that is being considered is 10Mbps. This participation and connectivity will provide an enhanced research environment for the Philippine R&E community.

TEIN2 is project that is primarily funded by the European Commission and supported by a number of Asian and European partner countries. It aims to build research and education connectivity between Europe and Asia-Pacific region, and within the Asia-Pacific region, for the benefit of the developing countries in Asia.

A Real-Time Environmental and Atmospheric Sensing System to Measure Air Pollution and Weather Parameters

Summary

A number of macroscopic and microscopic transportation and environment models have been developed to predict pollutant concentration from aggregate transportation demand and traffic simulation. However, there has been no system for dynamic validation of pollutant concentrations.

The Advanced Science and Technology Institute (ASTI), the Commission on Information and Communications Technology (CICT), the National Center for Transportation Studies of the University of the Philippines (UPNCTS), and the Nippon Telegraph and Telephone East Corporation (NTT-EAST) of Japan developed a system

and methodology to monitor air pollution in real-time and evaluate the environmental aspect through the utilization of the latest sensing technology.

This system is capable of measuring pollutant concentrations and weather parameters in ten (10) to sixty (60) minute intervals. The daily variation of pollutant concentrations were measured using the said intervals and correlation between pollutant concentration, weather parameters and traffic volume were simulated. The results of the simulation system are useful in the evaluation and implementation of urban transportation policies, measures, guidelines, and human resource programs of the national and government agencies.

The Challenge

A number of local and foreign agencies had conducted studies on air quality and monitoring of air pollutants. There had been several studies also that established the relationship between roadside concentration of pollutants and road traffic flow in Metro Manila's roadside environment.

However, there has been no system that was successfully deployed to undertake real-time processing of the

correlation between traffic congestion and air pollution to be able to gather actual and timely concentration useful in assessing environmental impact on a human body in the target area. In conventional studies, the amount of air pollutants is measured by passive samplers that require much longer measurement period and no dynamic validation has been conducted at real time.

How ASTI and the Collaborating Institutions Helped

The collaborating institutions set up a compact Suspended Particulate Matter (SPM) sensor with GSM/GPRS network module along with an Nitrogen Dioxide (NO₂) sensor and a weather transmitter to develop real-time sensing network. NTT-East of Japan provided for the weather, SPM and NO₂ sensors, which were developed by NTT Energy and Environmental Systems Laboratories (NTT E&E).

ASTI developed the embedded controller for the GSM/GPRS mobile network that was used to link the sensors to a server in the Philippines to be able to transmit the data gathered. The calculation/interpretation program needed to process and interpret the raw data coming from the Philippine Server (PH-SV) was also provided through NTT-East.

The constraint on intellectual property concerns, which did not allow the disclosure of the the calculation program, was addressed by the establishment of the following processes:

- the observation data is transferred and stored in the Philippine Server (PH-SV) periodically over the GSM network via GPRS from the sensors set along an arterial street of Metro Manila, the deployment site;
- the stored data of the PH-SV is transmitted to Japan Server (JP-SV) periodically over the Internet and stored;
- in JP-SV, the raw SPM and NO₂ data are processed, calculated, and made available over the web for access by the public from anywhere and anytime in an understandable format or graphical representation.

ASTI, through its Philippine Research, Education and Government Information network (PREGINET), which is connected to the international R&E networks as well as to Commodity Internet, also facilitated the periodic transfer of the data on SPM, NO₂, and weather parameters from PH-SV to JP-SV to be processed and

made available over the Internet in real time. Moreover, the processed data were also utilized by for simulation by NTT-East using a 3-D localized atmospheric environment simulator to estimate the the area with high NO₂ concentration.

UP-NCTS conducted the necessary traffic count survey to determine the traffic volume and density. Traffic volume was encoded and processed to estimate the amount of vehicle emissions based on the traffic volume, speed of vehicle, and vehicle emission factors.

CICT is the key supporter and proponent of this project. The results of the simulation system are useful to CICT as a relevant source of information on the application of ICT for the environment and in the formulation and evaluation of policies on the adoption of ICT to enhance different areas of endeavor.

The Asia-Pacific Telecommunity (APT) under its Asia Pacific HRD Programme for Exchange of ICT Researchers/Engineers through Collaborative Research provided funding support for this project.

Results

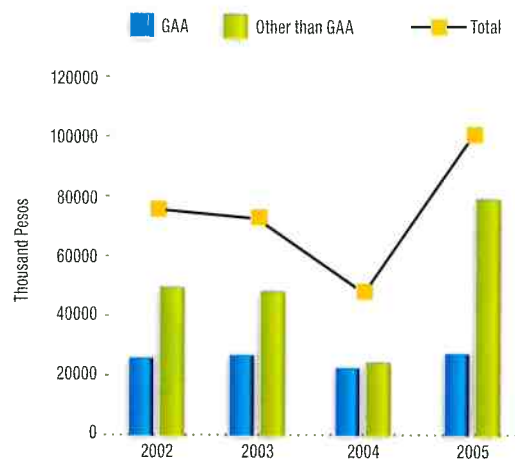
The concentrations of NO₂ and SPM and the traffic volume at the target area were measured. NO₂ concentration was simulated and the area with a high NO₂ concentration was estimated. The results of this study showed that NO₂ concentration has a tendency to increase in canyon areas, and that SPM concentrations depend more on traffic volume than on land use.

This system, therefore, served as a model for the conduct of similar real-time environmental sensing and monitoring system, which is of great help in simulating and evaluating environmental impact of governmental policies in the national and local government.

SPM and NO₂ were among the pollutants considered because SPM has recently been recognized as an air pollutant that has causal correlation with the human fatality rate and NO₂ is recognized as an air pollutant that causes respiratory illness.

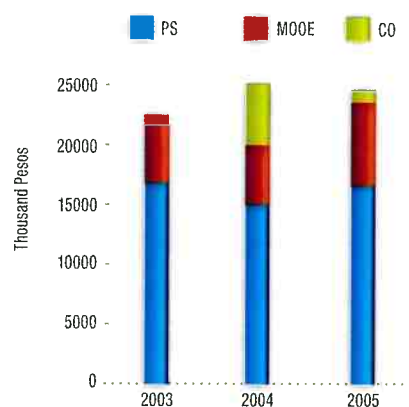
Sources of Funds

	2002	2003	2004	2005
GAA	27,214	27,124	22,351	24,511
Funds other than GAA	50,043	47,613	23,988	84,438
Total	77,257	74,737	46,339	



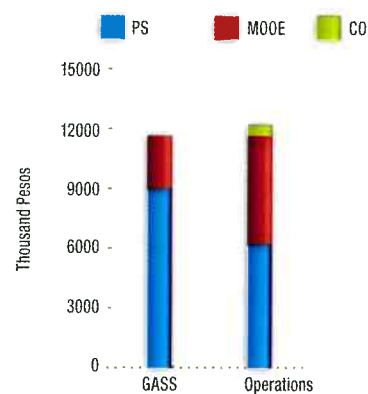
2003 to 2005 GAA (Actual Obligations)

	2003	2004	2005
Personal Services (PS)	16,752	14,962	15,919
Maintenance & Other Operating Expenses (MOOE)	5,578	5,160	6,169
Capital Outlay (CO)	0	4,140	1,376
Total	22,330	24,262	23,464



Use of Funds (2005 GAA)

	GASS	Operations	Total
Personal Services (PS)	8,785	7,134	15,919
Maintenance & Other Operating Expenses (MOOE)	2,362	3,807	6,169
Capital Outlay (CO)	0	1,376	1,376
Total	11,147	12,317	23,464



ORGANIZATIONAL CHART

Office of the Director

Finance and Administrative Division

Communications Engineering Division

Computer Software Division

Microelectronics Division

Special Projects Division

Agency Divisions and Staff

The OD handles the overall agency management. It is tasked to provide effective leadership to the organization as well as properly manage the agency to achieve its targets. It continuously seeks to identify potential partners and allies. To meet its goal the OD implements project management systems to ensure that solutions meet client expectations, conducts regular assessment of the competencies required by the agency to achieve its mission, and develops and implements competency acquisition and building programs for the staff.

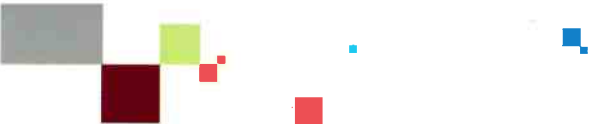
Furthermore, the OD seeks to maximize funds and grants to support the agency projects as well as develop and implement revenue generating programs to increase funds available for R&D.

The FAD provides financial, administrative and general support and other necessary services for the welfare of the agency and its staff.

The Communications Engineering Division (CED) aims to contribute to the emergence and growth of the local and communications engineering industry through research and development in communications engineering and its applications for the industry, government,

academe and other sectors of the society. Its efforts include development, enhancement and deployment of systems on broadband wireless networks and platforms; RF/microwave circuit design; audio, video and voice over IP applications; and the management of the Philippine Research, Education and Government Information Network (PREGINET), the Research and Education Network of the Philippines that interconnects government, academe and research institutions nationwide for R&E activities and spearheads the development of applications in areas such as distance education, tele-health, agriculture, bio-informatics, disaster mitigation, and networking technologies.

The Computer Software Division (CSD) aims to be one of the leading research groups in the Philippines on software and network applications development. The group is involved in the development of Open Source Systems such as the Bayanihan Bluetooth Developer's Toolkit; Bayanihan Linux Desktop Solution; and the Bayanihan Linux Terminal Server (BLTS). It also aims to make significant contributions to national development by providing solutions for government agencies, academic institutions and SMEs and provide development platforms for the local industry.



The Microelectronics Division (MED) aims to catalyze advancements in microelectronics research by developing state-of-the-art design capabilities to promote a culture of technology awareness and encourage active involvement from the academe, government RDIs, industry and other sectors. Its efforts are focused on managing the ASTI-VCTI Open Laboratory, and establishing the design foundation and know-how vital for the Philippines to enter the global market for integrated circuits.

MED has been realizing its goals through the conduct of various trainings and seminars to further enhance the skills of the country's pool of IC designers. Aside from these trainings and seminars, MED continually collaborates with government agencies, the industry

and the academe to upgrade the capability of Filipino engineers and to address the needs of the local electronics industry.

The Special Projects Division (SPD) is composed of the Embedded Systems Group (ESG) and the Printed Circuit Board (PCB) Team. The ESG aims to address the growing need in embedded software and hardware design in the Philippines. The PCB Team, on the other hand, provides PCB layout design and fabrication services to ASTI's technical divisions. It also conducts its own particular platform of research to enhance its capabilities in the services it offers. SPD also offers these services to local electronics companies, academe, and other enthusiasts.

Directory of Key Officials

Denis F. Villorente

Director, ASTI

Tel. No.: (632) 426-9755, (632) 925-8598

Fax. No.: (632) 426-9756

E-mail: denis@asti.dost.gov.ph

Atty. Carmencita M. Echano

Chief, Finance and Administrative Division

Tel. No.: (632) 426-7423

Fax No.: (632) 426-9756

Email: menchie@asti.dost.gov.ph

Peter Antonio B. Banzon

Chief, Computer Software Division

Tel. No.: (632) 426-9759, (632) 426-3572

Fax No.: (632) 426-9756

E-mail: peter@asti.dost.gov.ph

Aileen Joy A. Deoma

Chief, Microelectronics Division

Tel No.: (632) 426-9760

Fax No.: (632) 426-9756

E-mail: aileen@asti.dost.gov.ph

Jose Eric S. Maglangue

Chief, Special Projects Division

Tel No.: (632) 426-3694, (632) 426-9760

Fax No.: (632) 426-9756

E-mail: joric@asti.dost.gov.ph

Jesus C. Manio

OIC, Communications Engineering Division

Tel. No.: (632) 426-9766, (632) 426-9764

Fax No.: (632) 426-9766, (632) 426-9756

E-mail: jess@asti.dost.gov.ph

Publication Staff

Editor-in-Chief **Jose Eric Maglangue**

Associate Editor **Aileen Joy Deoma**

Editors / Writers

Emma Juco **Juvy Castaneda**

Tere Patula **Jeng Tetangco**

Art Director **Peds Mangahas**

Photos **Odette Trinidad**

Photos on the Cover **CJ Dideles**

Photo of ASTI Building **Leonardo Coll**

Publisher **Advanced Science and Technology Institute**

Year 2005

IMAGES in this years Annual Report were contributed by the men and women of the Advanced Science and Technology Institute.



...moving beyond possibilities

